sure of that father's approval. The task was, no doubt, a difficult one, for to write such a life from a perfect standpoint would have required, over and above literary skill, not only a most tolerant sympathy with the religious views and feelings of the man, but also a large acquaintance with the studies of his life, and neither of these qualifications does Mr. Edmund Gosse lay claim to. Still in the chapter of "General Characteristics" there is a fair summing up, though we cannot agree that "his letters were usually disappointing." In these columns we have not felt at liberty to allude, except in the most passing way, to the subject of the religious features of Gosse's life, and yet to the student of the man this aspect is one of great interest: for it we must refer the reader to his "Life."

The aim of this volume was to present the reader with a sketch of a man who has left his mark on the popular natural history of this century, and we believe that this object has been fully accomplished.

Here and there we have noticed, as we read, a few oversights, the most of which the biological reader will be able to correct as he reads. The words on p. 194, "the prints of Musignano," might not at first seem to indicate "the Prince of Musignano," afterwards known as the Prince of Canino; and in reference to the statement on p. 241, about Gosse's discovery of *Balanophyllia regia* on the coast of Devonshire, it is nowhere stated in the "Rambles on the Devonshire Coast" that the genus Balanophyllia was only known till then as containing fossil forms. Philip Gosse certainly knew otherwise.

E. P. W.

A CLASS-BOOK ON LIGHT.

A Class-book on Light. By R. E. Steel, M.A., Bradford Grammar School. (London: Methuen and Co., 1891.)

MR. STEEL'S book contains a curious mixture of good and bad. There is a great deal in it which may be most warmly commended. Many of the explanations are clear and concise; the figures are, on the whole, good, and the proofs sound and complete; the style is generally interesting, and the important points duly emphasized; but, with all this, there are some truly astounding statements, which detract immensely from the merits of the whole.

In the first chapter, Mr. Steel endeavours to explain how it is that we look upon light as a form of energy. He tells us (p. 4): "Thus, we can measure energy by the mass moved into the distance moved through against a known force, or by the mass moved multiplied by the increase of velocity produced"—two false statements which have not even the merit of being consistent. Or, again: "Light is a form of energy. . . ." "It is a vibration of the particles of ether. . . ." A form of energy cannot also be a vibration; the vibrating particles of ether possess energy, and if the vibrations be of a certain kind, this energy affects the eye as light. On p. 5 we have the following statement:—"We can pass electricity along substances such as carbon which offer great resistance, and thereby the electricity is converted into light. . . ."

It is, of course, difficult to explain, at once simply and in precise language, the relations between the various forms of energy; but this difficulty hardly affords sufficient excuse for the vague or erroneous expressions found in this part of the book; and it is to be hoped that, whenever another edition is called for, there may be some modifications introduced here. For, as has already been mentioned, the optical part is good, though some points are open to criticism. Thus, the proof given in § 12 does not really deduce the law of reflexion from the wave theory. This cannot be done without the principle of interference. It is said, p. 25, line 11, that, under certain circumstances, "DC must be the reflected wave"; but why? The point requires proof, and none is given. A similar criticism applies to the explanation of the law of refraction (§ 29). These points might with advantage have been further considered after § 80, which gives the explanation of the rectilinear propagation.

The first eight chapters deal mainly with geometrical optics, and contain nearly all the propositions which are ordinarily required. The formulæ for refraction through a lens proved in § 41 might also have been proved in a manner similar to that employed in § 22, when treating of reflexion at a mirror.

The earlier part of chapter vi., dealing with dispersion and the spectroscope, is rather meagre. A figure might with advantage have been introduced showing the path of a pencil of rays in a spectroscope.

Throughout the book a little more care might have been bestowed on the position of some of the figures. Thus, Fig. 72 is referred to on pp. 92 and 93, and not on 94. Had it been placed on p. 93, it could have been seen without turning over the leaf; it is, however, on p. 94, where it is not wanted. The same sort of thing is noticeable in other places; thus § 39 is headed "Concave Lenses"; after four lines of letterpress we have Fig. 61, but this is a figure of a convex lens referred to in the previous section. The figures for § 39 are over the page; of course the letterpress makes it clear which figures are meant, but still the arrangement is confusing to the student.

A good deal of matter—perhaps a little too much—is condensed into the last three chapters, dealing with interference, double refraction, and the interference of polarized light, but all that these chapters contain may be read with advantage. In the hands of a teacher who will correct the errors of the earlier part, the book may be used with profit.

THE PHILOSOPHY OF SURGERY.

Studies of Old Case-books. By Sir James Paget, Bart. Pp. ix. and 168. (London: Longmans, Green, and Co., 1891.)

IN this little book, Sir James Paget has digested some of the stores of knowledge which he has acquired in the course of a long and active professional life. Since he first became a medical student, Sir James tells us, he made it a practice to take notes of all the interesting cases which came under his notice, so that the quantity of material which he possesses in the way of unedited manuscript must be enormous, and he is thereby brought into the same class as John Hunter, though we may sin-

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cerely hope that, for the benefit of posterity, his records of cases will not share the same fate as befel Hunter's. Sir James is, however, rather sceptical as to the value of the observations which he has recorded at the cost of so much labour, for he says: "While looking through, and in some degree studying, the many thousand cases thus recorded, it has not been difficult to find why they would be now so nearly useless and uninteresting to anyone but myself." The changes which a progressive science like surgery necessarily undergoes in the course of sixty-one years enable the notes to be read by the light of our present knowledge, often with disheartening results when we reflect how difficult a thing it is to interpret a fact, even when it has been recorded. The use, however, of keeping up such a series of case-books is thus forcibly put forward by the author:—"The habit of recording facts is nearly essential to the habit of accurately observing and remembering them. That which we intend to record we are bound, and may be induced, to observe carefully, and the very act of carefully recording is nearly equivalent to a renewed observation." These studies, however, are not mere transcriptions from the old case-books, but they are a series of short essays upon rare or little-considered surgical cases which from time to time have come under the notice of the author. Each essay is full of that philosophy which can only be acquired by the most highly cultivated minds, and even by them only after a long and observant career. Each essay, too, is full of suggestion for further work—work which will not be carried out by Sir James Paget himself, but work which he may well live to see carried through by the younger generation of scientific surgeons, who look to him as a friend and a guide in those numerous difficulties which beset all earnest inquirers after truth.

The essays are seventeen in number, and, with a few exceptions, deal with subjects which are of interest only to the medical man. Two of the chapters are of interest to the general reader, however—that on errors in the chronometry of life is the most interesting, in which an attempt is made to show how many of the phenomena in health and disease may be explained by assuming that they are due to a disturbance of the time-rate at which the processes of life are discharged. For example, certain turtles lay their eggs in hollows made in the sand, leave them there to be hatched, and, at the time of hatching, return to them for the sake of their young. It might be asked, How can these creatures, and many others in similar cases, reckon the passage of time? Most probably they do not reckon it at all: but just as the timely-attained fitness of their organization for preparing and filling their nests impelled them to those acts, so some time-regulated organic processes, taking place in them after the laying of their eggs, bring about at length a new condition, of which a dim consciousness becomes an impulse to them to return to their nests. In the other essay of general interest, Sir James Paget discusses the use of the will for health.

OUR BOOK SHELF.

Euclid's Elements of Geometry. Books III. and IV. Edited by H. M. Taylor, M.A. (Cambridge: University Press, 1891.)

It is only of late years that the University of Cambridge has taken the wise step of giving greater scope to the teaching of geometry by not insisting on the actual proofs of propositions as presented in Euclid's text. All the definitions, axioms, and postulates, together with the sequence of propositions which he adopted, are retained, but in solving them "no proof will be accepted that assumes anything not proved in preceding propositions."

The work under consideration is published in the "Pitt Press Mathematical Series," and it will be found to contain some important changes, both with regard to the proofs and method of arrangement. In the first few propositions of Book III. the author has introduced several proofs which seem preferable to those generally adopted, while their order of sequence has been extensively changed. The alterations in the remaining propositions of this book have not been carried to any extent, but several outlines of alternative constructions have been inserted in cases where they may be most instructive.

Of the additional propositions introduced, one involves the principle of the rotation of a plane figure about a point in its plane, while following Proposition 37 are two others, the latter of which is commonly known as Ptolemy's theorem. Ten other additional propositions are at the end of this book, and they will serve as a good introduction to the many theorems on poles and polars, radical axes of circles, orthogonal circles, and the nine-point circle of a triangle. In the fourth book the propositions are as usual, no material alteration having been made. Throughout the work each proposition is accompanied by numerous exercises, while a capital set of miscellaneous problems terminates each book. We may safely say that the work of which this is an instalment will take the first place among the many books on the elements of geometry.

Zoological Articles contributed to the "Encyclopædia Britannica." By E. Ray Lankester, M.A., &c., and others. (London: Adam and Charles Black, 1891.)

Under the above title, Prof. E. Ray Lankester has republished a series of articles communicated by himself and others to the recently published edition of the "Encyclopædia Britannica," the whole forming a very admirable and well-illustrated treatise on some of the more important groups of the animal kingdom.

The memoirs on the Protozoa, Hydrozoa, Mollusca, Polyzoa, and Vertebrata are by Prof. Lankester; that on the Sponges is by Prof. Sollas; that on the Planarians is by Prof. von Graff; that on the Nemertines is by Prof. Hubrecht; that on the Rotifers is by Prof. Bourne; and that on the Tunicates is by Prof. Herdman.

While not professing to be a complete hand-book to zoology, this volume will be a very useful one to the student, as it will give him an excellent summary of the most recent views of the above specialists on the various groups treated of.

A few new figures have been added to the original text, and a few errors—due to previous oversight—have been corrected. Some quite recent discoveries are alluded to in footnotes, while in the preface Prof. Lankester points out one or two important alterations in classification and nomenclature which it was not possible to incorporate in the text.

The illustrations are refreshingly new, and they are as attractive as instructive. This volume is one we can very strongly recommend to all working students.

The British Empire: the Colonies and Dependencies. By W. G. Baker. (London: Blackie and Son.)

This volume is one of the series known as "Blackie's Geographical Manuals," and forms the second part of a book on the British Empire, the first part having dealt with "the home countries." The author sets to work systematically, beginning with the British possessions in Europe, then advancing to those in Asia, Africa, America, and Australasia. The method he adopts in describing

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